National Aeronautics and Space Administration

SLS Stage Requirements

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Space Launch System

Technical Integration

- **Complex system design is divided (compartmentalized) into achievable**

- **Technical integration is crucial to the integrated design effort**
  - Have requirements, ICDs, legal agreements
  - Communication is key
    - Continuously checking requirements and their flow, verification
    - Continuously checking assumptions
    - Continuously checking implication of changes

- **Interfaces and data flow among the pieces (subsystems) is identified**

- **Design conflicts will happen**
  - Integrated approach to solution will be needed

Technical Integration (cont'd.)

- **All changes occur in a system and affect the system as a whole**
- **"-ilities" (manufacturability, operability, etc.) must be considered as part of the design solution**
- **Risks**
  - Risks of the integrated system
  - Risks of the divided pieces (subsystems)
- **Understand sensitivities, uncertainties, and margins across the vehicle, elements and subsystems to balance risk**

Requirements

- **Set of requirements for the integrated vehicle**
  - Derived requirements for element
    - Derived requirements for subsystems within element
- **Environments at the integrated vehicle level**
  - Set of particular environments for element
    - Set of environments for subsystems within the element
- **Verification for the integrated vehicle**
  - Derived verification for the element
    - Derived verification for subsystems within the element
- **Partners use their internal specifications/processes (such as materials and processes specifications)**

Interface Control Document

- Iterative process based on maturity
- Keep-out zones
- Actual mechanical and electrical interfaces
- Provisioning of attachment hardware
- Who does what analysis including analysis across the interfaces
- Mechanism for resolution of design conflicts

Testing

- Development and verification testing is critical
- Testing based on building block approach – subscale, full-scale, subsystem, component, system
- Types of testing – development, qualification, verification, certification, acceptance
- Mutual understanding of assumptions and limitation of tests